CODE 415

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS
WASHINGTON 25, D. C.

S1-4-(1) (415)
SECTION L-2
4 April 1950

From: Chief, Bureau of Ships
To: All Holders of General Specifications for Building Vessels of the United States Navy, BuShips Mailing List 451-H.

Insert section in your copies of General Specifications.

A. M. Morgan
By direction

GENERAL SPECIFICATIONS FOR BUILDING VESSELS OF THE UNITED STATES NAVY

DEPARTMENT OF THE NAVY, BUREAU OF SHIPS

SECTION L-2
INSULATION

Superseding section L-2, dated 15 October 1947

For insulation and soundproofing of ventilation ducts and trunks, see section U-20.

For insulation of pipes, see General Specifications for Machinery, section S39-2.

L-2-a. Scope

This section contains requirements for insulation that is provided:

To reduce rate of heat transfer through ship's structure to or from heated, ventilated, or cooled spaces, so as to minimize weight, size, and power of equipment required to control temperatures.

To reduce condensation.

To reduce noise levels.

To reduce rate of heat transfer through ship's structure to unventilated spaces such as storerooms.

In ammunition spaces, to retard excessive temperature rises that would otherwise result from fires in adjacent spaces.

L-2-b. General requirements

Thermal insulating material.—To be hard surface fibrous glass board, JAN Spec. JAN-G-742, unless otherwise specified.

To be attached to steel structure by threaded studs previously welded to the steel surface and protruding through the insulating board, together with nuts and washers for holding board in place. On aluminum structure, use flat galvanized steel clips riveted to the surface with aluminum rivets instead of studs. Clips shall terminate in a split point, over which a slotted round washer shall be fitted to hold the board in place, and the halves of the split point bent down in opposite directions.

Apply cement, N. D. Spec. 52C23, to back of insulating board before installation and to seams after installation; cover seams with tape.

Installation procedure and details of fastening to be as approved by Bureau.

Thermal insulation, when required, shall be fitted:

In heat-producing spaces, on hot side of bulkheads and overhead, and on under side of deck underfoot.

In mechanically cooled spaces, on cold side of bulkheads and overhead, and on under side of deck underfoot.

For other than heat producing and mechanically cooled spaces on side of bulkheads opposite stiffeners, if practicable, unless otherwise required. 5C

Insulation on vertical surfaces, except in cold storage spaces and uptakes, shall terminate 6 inches above the deck.

Exposed edges of insulation that are within 6 inches of deck under, exposed edges around doors and airports, and exposed edges in other locations where such edges are susceptible to injury, shall be protected by light Z or angle bars. Protect other exposed edges by cutting away board under hard surface for 1½ inches and bending down and cementing surface around edge of board. 5E 6C

Fit means to prevent drop-bolts and similar fittings from injuring insulation.

L-2-c. Living and working spaces (except submarines) 6

Includes the following:

Blower rooms, unheated.

Commissary spaces.

Crew's shelters and signal shelters except those having arches open to weather. 7C

Communication and ship's control spaces such as intelligence rooms, radio, radar spaces, plotting rooms, and gyrocompass rooms.

Catapult and elevator machinery rooms and all rooms containing hydraulic equipment, except steering-gear rooms. 7E

Crane, capstan, and windlass machinery rooms.

Diesel generator rooms (if located above light load water line.) 8C

Film stowage.

Laundry receiving and issue rooms.

Living quarters, including wardrooms, staterooms, cabins, berthing and messing spaces and locker rooms. 8E

Mechanical cooling machinery rooms (if located above design water line).

Medical and dental spaces, including battle dressing stations.

Offices, laboratories, issue rooms and all such working spaces. 9C

Passages connecting insulated spaces.

Pilot house.
Prisons.
Pump rooms (if located above light load water line).
Refrigeration machinery spaces (if located above design water line).
Repair stations.
Ship's store and ship's service store.
Sculleries.
Water closet spaces, washrooms.
Workshops and all other working spaces such as armories, battery charging spaces, CO_2 and oxygen transfer rooms, and garbage grinder rooms.
Spaces separated by expanded metal from spaces designated above.

Boundaries of spaces, where exposed to water or weather, except under decks covered with wood, to be insulated as follows:

Plane surfaces: 1-inch board.
On deck beams and girders up to 12 inches deep: 1-inch board on webs and flanges.
On deck beams and girders over 12-inches deep: 1-inch board on webs for 12 inches from exposed boundary.
Bulkheads abutting against exposed boundaries and not otherwise requiring insulation: 1-inch board for 12 inches from such boundary.
Structural members on vertical surfaces: 1-inch board on the webs only. Whenever these members exceed 12 inches in depth, 1-inch board on webs for 12 inches from exposed boundary.

Where deck above a space is partially protected from the weather, as by deck houses or wood planking, the overhead in exposed area shall be insulated; insulation to overlap protected portion 12 inches beyond limits of exposed area. Undersides of waterways of wood covered decks shall be insulated; insulation to overlap protected area 12 inches beyond edge of planking.

Insulation will not be required in way of shower stalls or built-in furniture, except that in way of berths built in against insulated boundaries, insulation shall extend behind the berth down to and out 9 inches on deck or to back of subbase, whichever is less. Shelf plates and end filler plates of these berths shall be terminated at inboard surface of insulation and fastened to clips extending through insulation and welded to structure. To allow air circulation between berth and boundary, provide openings fitted with ¼-inch wire mesh screens at each end of shelf plate; each opening to have a minimum gross area of 36 square inches. Wherever practicable, provide similar openings at or near the deck, in filler plates between berth ends and insulated boundary.

L-2-d. Heat producing spaces (except submarines)

Includes the following:

Engine rooms and engine-room casings.
Evaporator rooms.
Fire rooms and uptake enclosures.
Generator and auxiliary machinery rooms.
Main motor rooms on diesel-electric ships.
Main propulsion engine rooms, including muffler enclosures on diesel-electric or direct drive diesel ships.
Main switchboard and distribution rooms.
Steam pipe passages.
Trash burner compartments.
Other compartments containing machinery or apparatus causing high temperatures, but not including compartments in which heat may be due to machinery or apparatus subject to occasional use only.

Insulate boundaries so as to cover completely those portions of the decks, overheads, and bulkheads that adjoin, or form a portion of, structure bounding the following:

Ammunition spaces as defined in paragraph L-2-e.
Cold storage spaces.
Living and working spaces as defined in paragraph L-2-c.
Passageways.
Storerooms.

Where boundary is only partially exposed to any of these spaces, extend insulation 15 inches beyond exposed area.

Plane surfaces, where required to be insulated, shall be covered with 2-inch board. Webs and flanges of beams and stiffeners less than 15 inches deep shall be covered with 1-inch board. Webs of beams and stiffeners over 15 inches deep shall be covered with 1-inch board for 15 inches from boundary.

Other bulkheads bounding or in heat-producing spaces and not otherwise requiring insulation shall be fitted with 1-inch board extending down 15 inches from deck overhead. Insulation is not required when such bulkheads are terminated by a deck exposed to the weather.

Supplementing the above list of heat-producing spaces, the following shall be covered with 1-inch board on overhead and vertical plane surfaces and on webs and flanges of beams and stiffeners:

Blower rooms which are plenum chambers for exhaust systems serving heat producing spaces.
Emergency diesel generator rooms.
Flight deck amplifier rooms.
Laundry.
Radar transmitter rooms.
Steering gear rooms which are not mechanically cooled.

Galleys, pantries, bakeries, and sculleries.—Insulate the following areas with 1-inch board on plane surfaces and on webs and flanges of beams and stiffeners wherever such areas are in way of other living or working spaces:

On under side of deck over.
On cold or far side of bulkheads for those areas opposite ovens, ranges, and dishwashing machines.

L-2-e. Ammunition spaces (except submarines)

Insulation to consist of 1-inch board, and on boundaries where it is required, shall cover beams, stiffeners, and plane surfaces. Insulate bulkheads and overheads on magazine side. Insulate decks underfoot on under side except omit insulation altogether in tanks containing liquids and in void bottom compartments.

Insulate boundaries of magazines, clipping rooms, and ready-service spaces containing any of the following:

Catapult charges.
Detonators and detonating elements.
Fixed ammunition containing smokeless powder.

Fuses.
Pyrotechnics.
Rocket motors.
Small arms ammunition.
Smokeless, flashless, and black powder.

Insulate horizontal and vertical boundaries common to any two such spaces, horizontal boundaries on under side only, and vertical boundaries on both sides.

Insulate magazines for any ammunition listed below, on boundaries that are contiguous to spaces having design temperatures higher than 110° F.:

Bomb type ammunition.
Depth charges.
Float lights.
Mines and mine charges.
Rocket heads.
Smoke and gas bombs.
Smoke signal markers and flares.
Warheads.

In addition to the above requirements, and regardless of kind of ammunition contained, install insulation in all magazines, handling rooms and ready-service spaces, on vertical and overhead boundaries exposed to the weather.

Fit 1-inch board on doors or hatches of magazines that are in insulated boundaries.

In magazines for warheads, aircraft bombs, depth charges, mines, demolition charges, or other kinds of bomb-type ammunition, avoid any possibility of contact between explosive-exudate and insulation. When insulation is required for such spaces, it shall not be installed on magazine side of bulkheads. Where this is not practicable, insulation may be fitted on magazine side, but shall be stopped 3 inches above deck underfoot. Insulation shall not be installed on top surface of deck underfoot in such a magazine; it may, however, be installed on magazine side of overhead.

Insulation specified above shall be in addition to that specified in paragraph L–2–d.

Insulation shall not be installed on the following boundaries of any magazine:

Bulkheads in way of water tanks.
Shell of ship below light load waterline.

L–2–f. Mechanically cooled space (except submarines)

Boundaries that are exposed to the weather or are common to spaces whose maximum design temperature is above 98 degrees F., to be insulated with 1-inch board on webs of beams and stiffeners and on plane surfaces, but if insulation of equal or greater thickness has been required by paragraphs L–2–c, L–2–d, or L–2–e, such insulation will be deemed sufficient.

L–2–g. Cold storage spaces (except submarines)

Insulating material, thicknesses, and construction details to comply with plans, BuShips Nos. S5904–860247 and S5904–860248.

Insulation for doors to comply with plans, BuShips Nos. S5904–860249 and S5904–860250.

To minimize condensation in spaces underneath, or contiguous to and on the same level as cold storage spaces (except where contiguous spaces are voids or tanks), fit 1-inch board on warm side of boundary in way of such spaces; cover webs of beams and stiffeners, as well as plane surfaces.

L–2–h. Acoustic insulation

For limiting noise-level requirements of ventilation duct systems, see section U-20.

To consist of sound-absorbing blanket, N. D. Spec. 59B4, covered with aluminum-alloy sheathing. Sheathing shall be 0.04 inch thick, perforated with holes 3/32-inch diameter on 1/4-inch centers. Sheathing on boundaries of compartments to be painted as specified in Appendix 6 for the compartment; paint sheathing before installation and clear all holes of paint.

The following spaces shall be soundproofed with 2-inch blanket and aluminum sheathing:

Auxiliary combat information center.
Captain's tactical plot.
Combat information center.
Flag tactical plot.
Plotting rooms.
Radio central.

Acoustic insulation will not be required on doors to the foregoing spaces. Wherever acoustic insulation is required for noise reduction in fan rooms or plenum chambers, doors to these spaces shall be acoustically insulated only if the additional area is necessary to obtain the desired decibel reduction.

Insulation shall be applied on under side of deck over and, when practicable, on unobstructed portions of boundary bulkheads.

Face of sheathing shall be kept 3 inches below under side of deck (1-inch air space). Fit blankets on bulkheads without an air space (sheathing 2 inches from bulkhead).

When acoustic insulation is required in any area for which thermal insulation is specified in paragraph L–2–c or L–2–f above, acoustic insulation shall be considered as meeting the requirements for thermal insulation.

Installation of acoustic insulation, however, does not abrogate the requirements for thermal insulation on beams and stiffeners where specified in paragraph L–2–c or L–2–f.

Soundproof telephone booths.—Install where specified in Detail Specifications. To be without doors, but closed on top, back and sides; sides may be stopped about 18 inches above deck or gratings. Interior surfaces to be soundproofed with 1-inch blanket and unpainted aluminum sheathing.

L–2–i. Antisweat treatment (vermiculite paint)

To be applied in accordance with latest Bureau instructions, on warm side of uninsulated boundaries, including framing, as follows:

Interior surfaces of living and working spaces, storerooms, magazines, and handling rooms exposed to chilling by water or weather, or where sweating would occur because of opposite extremes in temperature.

Deck under, and all vertical boundaries of, mechanically cooled spaces common to spaces that are not mechanically cooled.

Exterior surfaces of water tanks in way of all compartments except voids.

To under surfaces of gravity cooling coil drain troughs and to exteriors of cans used to collect cooling coil drainage.

L-2-j. Submarines

Apply compressed cork slabs 1 inch thick, Fed. Spec. HH-C-561, to the following boundaries:

Entire inner surface of pressure hull above platform deck, including surface of hull within lockers, in all compartments except engine rooms, and except on overhead in way of main propulsion control units in maneuvering room.

Entire inner surface of conning tower above walking flat.

Entire inner surface of magazines, except overhead and deck underfoot.

Entire inner surface of pressure hull in storerooms.

Cork slabs ½-inch thick, protected by corrosion-resisting steel rubbing plates where necessary, shall be applied to access trunks. Install fibrous glass board, 1 inch thick, on inner surface of pressure hull in maneuvering room over main propulsion control units.

Cold storage spaces.—Insulation to consist of compressed cork slab and to be in accordance with the following:

Total thickness for spaces designed for temperatures of 15° F. and below, at least 5 inches; and in those spaces designed for temperatures above 15° F., at least 4 inches.

Thickness of insulation for partition bulkheads between two cold storage spaces may be reduced to 2 inches provided required temperatures can be maintained.

In way of insulated boundaries of magazines, insulation on contiguous boundaries of cold-storage spaces shall be decreased one inch in thickness.

Sheath entire inside of each space with nickel-copper alloy.

Apply cork paint to the following:

Frames in single hull ends of ship.

Inner shell plating in double hull portion of ship, except in engine rooms and in those locations where cork slabs are required.

Any other exposed structure subject to sweating.

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From: Chief, Bureau of Ships
To: All Holders of General Specifications for Building Vessels of the United States Navy, BuShips Mailing List 451-H.

L-2
Amendment 1
10 August 1950

Insert amendment in your copies of General Specifications

M. S. Hart

By direction

GENERAL SPECIFICATIONS FOR BUILDING VESSELS OF THE UNITED STATES NAVY

SECTION L-2.
INSULATION (dated 4 April 1950)

The following change should be made in this section:

Page 3, line 64, add:
"After installation, insulation shall be given three coats of vinylidene resin coating, BuShips formula 113, white, as a vapor barrier."

L-2
Amendment 2
16 November 1951

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SECTION L-2.
INSULATION (dated 4 April 1950)

The following changes should be made in this section:

Page 2, lines 84, 88, 90, 91 and 94, change "15" to "12"

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DEPARTMENT OF THE NAVY
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S1/4(415)
13 May 1953

To: All Holders of General Specifications for
Building Vessels of the United States Navy,
BuShips Mailing List 451-H

Insert the following amendments in your copies of General Specifications:

L-2, No. 3
Appendix 6, No. 2
Appendix 16, No. 3

By direction

SECTION L-2
INSULATION (dated 4 April 1950)

L-2
Amendment 3
13 May 1953

The following changes should be made in this section:

Page 1, lines 37 to 39, delete and substitute:

"Apply cement, Mil. Spec. MIL-C-3316, type II, over the seams and cover the seams with fibrous glass tape. No cement shall be installed behind the board except where necessary to secure small patches of board."

Line 55, delete "within" and substitute: "less than".

Line 56, delete "of" and substitute: "from".

Line 59 to 62, delete "Protect other * * * of board" and substitute: "Seal other exposed edges with fibrous glass tape".

Page 3, line 64, delete Amendment 1 dated 10 August 1950, and substitute:

"Fibrous glass board insulation installed on the warm side of refrigerated spaces shall have a vapor barrier consisting of three coats of vinylidene resin, Bureau of Ships formula 113, white, applied to the face of the insulation. The vapor barrier shall be applied to the face, the four edges, and two inches of the periphery of the bottom surface of each board as received. After fitting boards seal newly cut edges including periphery of bottom surface in the same manner; after installation coat all seams and touch up punctures in the vapor barrier (such as in way of studs) with three coats of vinylidene resin coating."

SECTION L-2
INSULATION (dated 4 April 1950)

The following change should be made in this section:

Page 3, line 64, after paragraph added by Amendment 3, dated 13 May 1953, add:

"Aluminum foil, which has been suitably strengthened with plastic on both sides or with a paper core may be used in lieu of vinylidene resin. Foil is to be installed with adhesive, Spec. MIL-C-3316, type II, after the insulation has been fitted. All pipes, brackets, and similar projections are to be covered first to permit a minimum 3-inch lap in the flat on the insulation. Care is to be exercised to assure that no open areas which might permit vapor migration through the barrier exist."